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Title: Environmental Air Monitoring at LANL

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External Assessment of Radionuclide NESHAP Program

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Technical Program Leader,

Radionuclide Air Emissions

Rad Air Emissions Measurements

- Evaluate radiological impacts of LANL operations on members of the public
- Not directly affiliated with cleanup operations or programmatic work; independent oversight
- Focus areas in Environmental Compliance Programs
  - Stack emissions measurements
  - Ambient air measurements
  - Minor source operations evaluations
  - Collaboration with Meteorology program
  - Collaboration with Dose Assessment program (ENV-ES)

Air Monitoring at LANL

- Goals: Identify & quantify LANL air releases
- Assess potential impacts
- Stack monitoring – measure the source
- Ambient monitoring – measure the receptor
- Analyze for particulates (dust) – uranium, plutonium, etc.
- Analyze water vapor for tritium
- Ensure regulatory compliance limits and requirements are met

Regulatory Drivers

- Federal Regulations
  - Clean Air Act, 40 CFR 61 Subpart H, *Radionuclide NESHAP*
    - Framework of operations – locations, methods, dose limit
    - Annual emissions report to EPA Region 6
- Department of Energy Orders
  - DOE Order 458.1, *Environmental Radiation Protection*
    - Radiological emissions measurements
    - Property transfer
    - Equipment release
  - DOE Order 151.1C, *Emergency Management*
    - Meteorology program
    - Accident response
  - DOE Order 231.1B, *ES&H Reporting*
    - Annual Site Environmental Report

Off-site Dose Limits

- Radionuclide NESHAP 40 CFR 61, Subpart H

  "National Emissions Standards for Hazardous Air Pollutants" as applied to emissions of Radionuclides from DOE facilities

  - **Limits off-site dose from LANL ops to 10 millirem/year**
    - Background in NNM is about 360-400 millirem/year

  - Annual report to EPA Region 6, due June 30 each year
    - Summarize operations, emissions, and dose consequence

- DOE Orders
  - 100 millirem all-pathway dose (air + food + water + direct radiation)
  - Reported in Annual Site Environmental Report

Rad-NESHAP functions

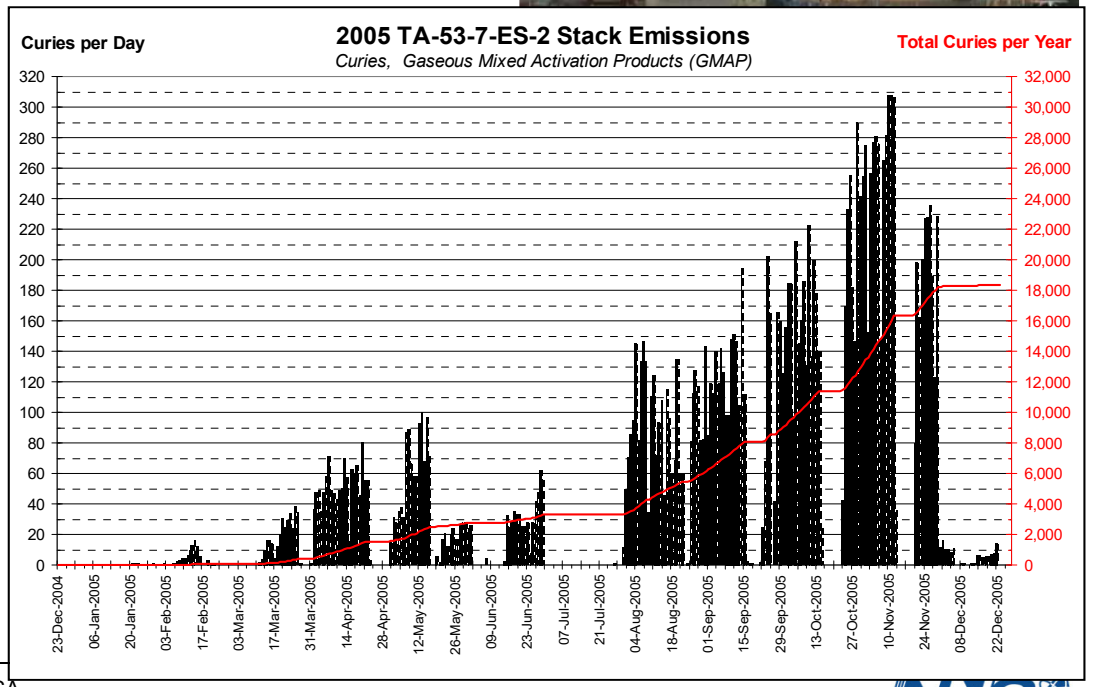
- Stack monitoring
  28 monitored stacks
- Operational assessments
  ~80 non-monitored stacks
- Airnet program
  46 stations
- Real-time emissions measurements
  LANSCE Facility
- Emissions calculations
- Stack engineering & performance testing
- New project reviews
- Dose assessment
- Meteorology monitoring for plume model calculations

Stack Sampling

- LANL's "significant" operations are continuously sampled
  - TA-55
  - CMR
  - WETF tritium facility
  - LANSCE accelerator
- Particulates, vapors, tritium
- Samples changed weekly
- Sampling data analyzed off-site (particulate) or at LANL (tritium)
- Emissions calculated & reported to web site

LANSCE – Real Time Monitoring

- Radioactive gases: carbon, oxygen, nitrogen
- In-line detectors – cannot capture samples on media for off-line analysis
- Emissions cannot be filtered from air stream
- Short half-life (20 mins)
- 2005 Operations: over 6 millirem!
- Leak discovered at control system inlet
- Fixed – 2006+ ops less than 0.1 millirem



Stack Engineering

- Flow measurements – per EPA Methods
- Pump maintenance via MSS craft
- Sample system inspections & cleaning
- ANSI N13.1-1999 requirements for design, maintenance, testing
- Design input for new & upgraded facilities: TA-55, LLW, GLADOS
- Performance testing (commissioning) new systems: TA-55;-59,-50

Non-monitored stacks – operations assessment

Radioactive Materials Usage Survey

- Track operations from non-monitored “minor” sources
  - Calculate emissions
  - Estimate off-site dose
  - Ensure low-level of operations
  - Annual review – largest potential
  - Bi-annual review – lower potential
- Evaluate operations at monitored stacks (“major sources”)
  - Ensure monitoring systems are appropriate for operations
  - Ensure we’re analyzing samples for appropriate nuclides
  - Bi-annual review (odd years)

Non-Point (Diffuse) Sources

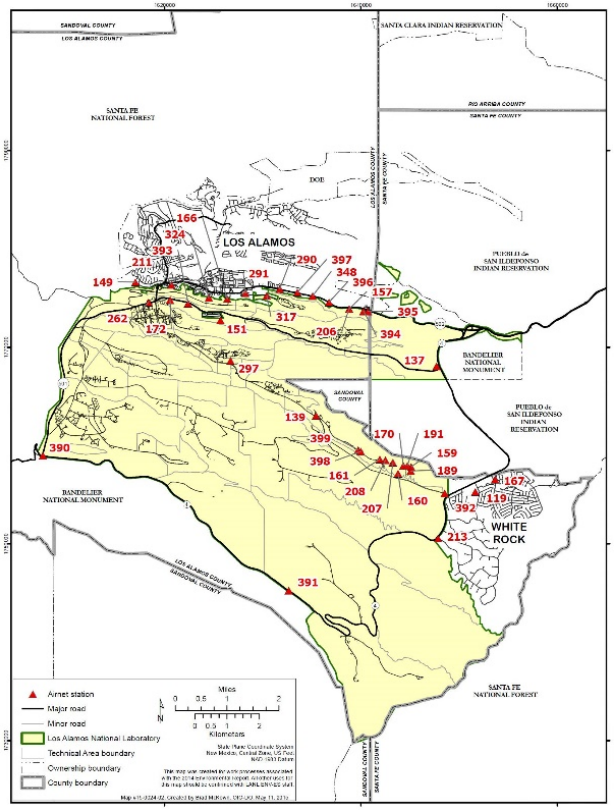
- Airnet program – Ambient Air Sampling program
  - Compliance measurements of non-point sources (double-count stacks)
  - Standard list of 20 stations + additional as needed
  - Airborne particulates (U, Pu isotopes) and tritium H-3 vapor

- LANSCE Diffuse emissions
  - Radioactive gases from accelerator facility & experimental areas
  - Not captured by Airnet
  - Air concentrations * flow rate = emissions
  - Measured at source, modeled by CAP88

- Others as needed; can vary year-to-year

Airnet Program – Ambient Air Measurements

- About 40 continuously operating air sampling stations
  - LANL perimeter (compliance)
  - On-site near certain diffuse sources
  - Regional stations for background
  - Bi-weekly change out (2 week runs)
  - Analyzed for particulates (Pu, U) and tritium in water vapor
  - Results posted to web, EPA report, and Annual Site Environmental Report



High-volume air sampling stations available

- Remote start for emergencies
- Also used for significant cleanup operations

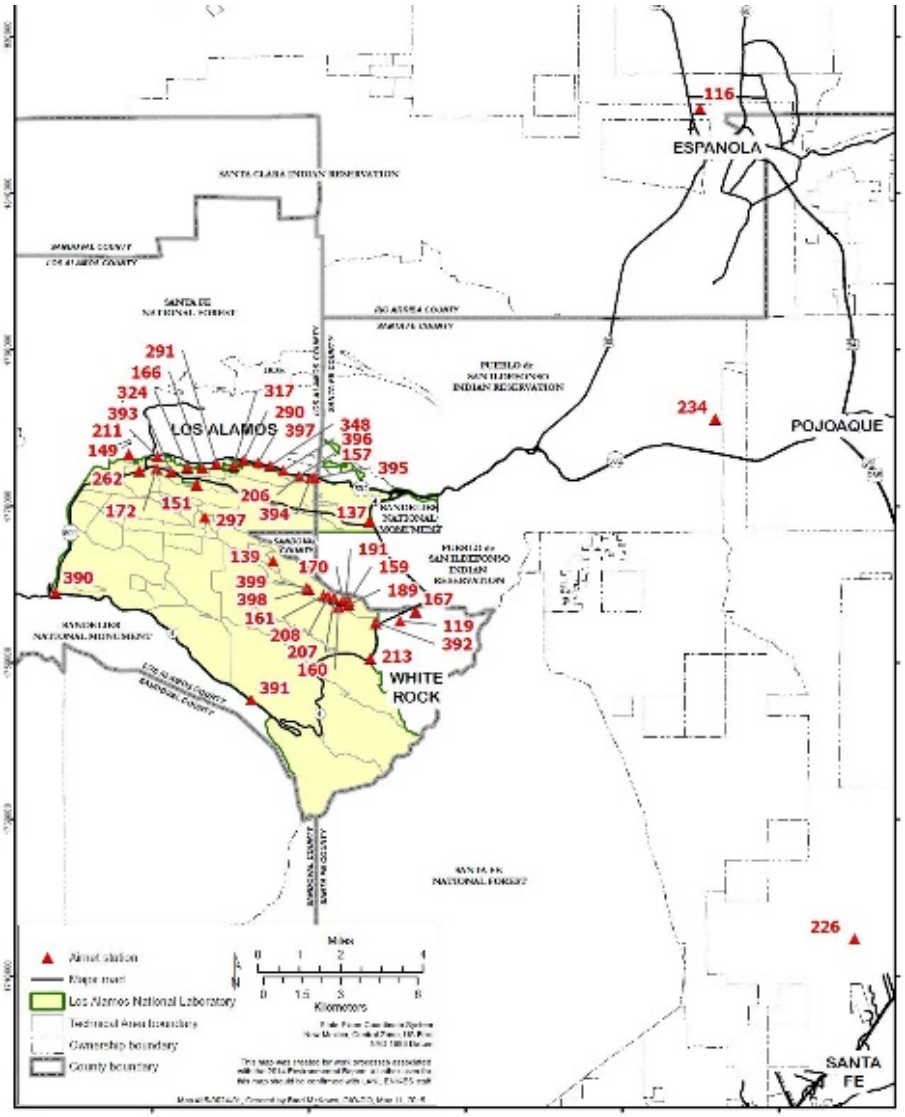
Airnet Locations around Northern New Mexico

Regional Background stations

- Espanola
- El Rancho (Pojoaque area)
- Santa Fe West

Additional stations:

- San Ildefonso Pueblo
- Jemez Pueblo
- Santa Clara Pueblo (indep.)



No LANL impacts have been measured at regional stations.

Special Response

- High flow rate stations, with generators
  - “high-vol” samplers
  - 10x flow rate of Airnet
- Activate existing stations immediately
- Deploy to new locations within hours
- Submit for analysis within 24 hours

Real-Time Surveillance

(In addition to LANSCE compliance program, described earlier)

- Environmental Continuous Air Monitoring
  - Program support – not for regulatory compliance
  - Real-time air concentration measurements
  - Focused on Pu-239; upgrade for additional nuclide(s)
  - Operated successfully at MDA-B cleanup & at TA-54 (RNS drums)
  - Possible long-term network
  - Endorsed by EPA; needs long-term resources

- Non-rad monitoring – total suspended particulate matter
  - Public interest only – no regulatory driver
  - Smoke & dust levels (sensitive to wildfires in NM, CO, AZ)
  - 2 stations: White Rock, Los Alamos town sites

Calculations

- Dose assessment
  - Use EPA-approved codes: CAP88 PC version 4
  - Atmospheric dispersion modeling, calculates off-site dose from stack emissions

- Databases
  - Stack information
  - Flow rate information
  - Sample field data & sample analytical data
  - Airnet data, samples
  - Emissions calculations
  - Track operations @ non-monitored stacks

Other activities

- New project reviews
  - Title V / Air Quality Compliance team, EPC-CP
  - Deployed Environmental Professionals, @ facilities

- Quality Assurance Program
  - Quality Assurance Project Plans for stacks, Airnet, met, dose
  - Data Quality Objectives for each area
  - Implementing procedures for specific tasks
  - Work control documents (IWD) for implementation at specific sites
  - Equipment calibration program

- Complex-wide activities - Other DOE sites, EPA Region 6, HQ, ANSI
- Public outreach – community meetings, LANL public meetings

Deliverables

- Annual report of rad air emissions – EPA, June 30 of each year, addressing prior year operations
  - Clean Air Act report; sources, emissions, off-site dose
- Annual Site Environmental Report (ASER) – DOE, Sep 30
  - Comprehensive review of LANL environmental activities & measurements, across all media
- New stacks starting operations
  - Notify EPA of intent to construct & operate; TA-50 RLWTF; TA-35; TA-59
- Review of Airnet station siting
  - Finalized for 2015 operations
- Airnet calculations moved to Intellus
  - Sample planning & data calculations on EIM/Intellus systems
- Upgrades / Modifications at LANL sources
  - Reviewed for monitoring & EPA notification needs.

Results in perspective

- 10 millirem dose limit
  - Background in Northern New Mexico = 400+ mrem
    - Cosmic, terrestrial radiation; additional dose from medical
  - 2005, 6.5 mrem from LANSCE; control system malfunction
  - 2011, 3.5 mrem from MDA-B cleanup
  - Past 4 years – less than 0.5 mrem/year; lowest in LANL history
- Airnet shows no measurable impact at regional stations
  - Detections are only seen at LANL border
- LANL has a comprehensive program to evaluate new operations, major & minor sources, and adapt to changing LANL and public locations.

Thanks for your time!

- Any questions?

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